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Conservation Assessment

for

Red Honeysuckle

(*Lonicera dioica* L. 'var. *glaucescens* (Rydb.) Butters')

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Technical Report 2003 (12)

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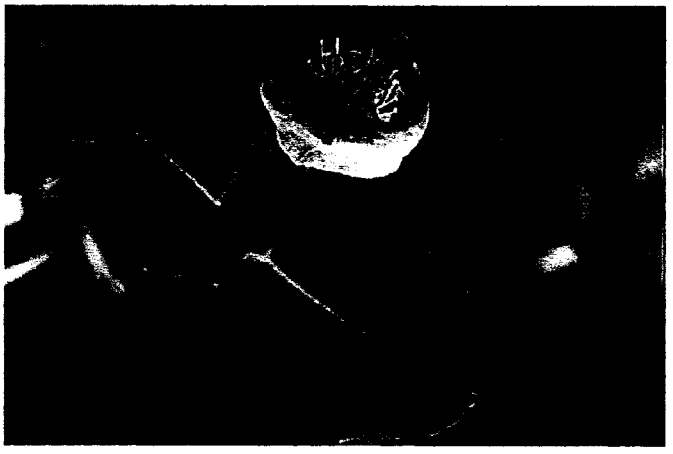
31 March 2003



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USDA, NRCS. 2002. The PLANTS Database, Version 3.5. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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ACKNOWLEDGMENTS

I would like to thank the staffs of the U.S.D.A. Forest Service, Shawnee and Hoosier National Forests, for the opportunity to compile these conservation assessments and for their invaluable assistance with data and field opportunities. Mark Basinger, Stan McTaggart, Steve Olson, Beth Shimp, and Steve Widowski were particularly helpful in facilitating both the cost share agreement and fieldwork.

I would also like to thank the staff of the Illinois Natural History Survey, Champaign, for their assistance with logistics necessary to complete these reports. I would especially like to thank John Taft for help in initiating these studies.

Several people assisted by contributing information on this vine. Among these, John Schwegman was particularly helpful in providing information on *Lonicera dioica* 'var. *glaucescens*' in Illinois, Anita Cholewa provided information on the plant in Minnesota, George Yatskievych provided information on Missouri populations, Steve Ginzbarg provided collection information from the University of Alabama herbarium (UNA), and Mike Vincent at Miami University (MU) provided information on reports of the species in Ohio. Gordon Tucker and John Ebinger provided specimens for this study from the Eastern Illinois University herbarium, and the staff of the University of Wisconsin herbarium were especially helpful during a visit to their herbarium for the examination of their specimens.

Dr. K. N. Gandhi, Harvard University, provided crucial information regarding the nomenclature for this variety.

Additional thanks are extended to Ariane Hoard, my student at the University of Illinois during the summer of 2002, for her help in searching for information on the Internet and literature in support of several of these assessments (W-1), and to my assistant Sherry Weaver for her continuing assistance in database management and processing the plant specimen vouchers.

This material is based upon work supported by the U.S.D.A. Forest Service, Eastern Region, under Cost Share Award No. AG 01CS-11090804-032 (1-5-28861). Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author and do not necessarily reflect the views of the U.S.D.A. Forest Service, Eastern Region.

EXECUTIVE SUMMARY

This Conservation Assessment is a review of the distribution, habitat, ecology, and population biology of the Red honeysuckle, *Lonicera dioica* L. 'var. *glaucescens* (Rydb.) Butters', throughout the United States and Canada, and in the U.S.D.A. Forest Service lands, Eastern Region (Region 9), in particular. This document also serves to update knowledge about the status, potential threats, and conservation efforts regarding the Red honeysuckle to date. The Red honeysuckle is a perennial fibrous vine that has also been described as a climbing shrub, it has yellowish to distinctly rose-colored flowers, globose reddish-orange berries, and it has leaves that have a hairless upper surface and a sparsely to densely villous-pubescent and distinctly glaucous (pale-waxy) lower surface. The status of the variety is controversial and some botanists do not accept it as distinct. The nomenclature is likewise complicated. If it is to be accepted as a variety, its correct name should be *Lonicera dioica* var. *douglasii* (Lindl.) Farw., otherwise it could be considered a minor variation within *Lonicera dioica* L. The vine grows mainly in moist open forests and thickets and occasionally on dunes, outcrops, or in wetlands. The species itself is found in much of the United States east of the Rocky Mountains (in 31 states) and Canada (in 8 provinces). The range of this variety tends to be in the western portion of the range of the species in 17 states and 7 Canadian provinces. It propagates primarily by seeds, but its stems are capable of rooting and new plants are easily established. Globally, the species ranking is G5 (secure world-wide) and the variety rank is T5 when it is recognized as distinct. The Red honeysuckle (as *Lonicera dioica* var. *glaucescens*) is listed as Endangered in Illinois, *Lonicera dioica* var. *orientalis* Gleason is listed as Endangered in Kentucky, and the species collectively has been listed as Endangered in Maine and of Special Concern in Tennessee. The Red honeysuckle (as var. *glaucescens*) has been included on the Regional Forester Sensitive Species list (RFSS) for the Shawnee National Forest but not the Hoosier National Forest, where it has not been reported. In Illinois the typical variety is considered to be secure but 'var. *glaucescens*' is considered to represent a southern disjunction in the state and it is considered vulnerable because it has only two known occurrences. It faces extirpation in Illinois if it is not properly protected.

In addition to species listed as endangered or threatened under the Endangered Species Act (ESA), or species of Concern by U.S. Fish and Wildlife Service, the Forest Service lists species that are Sensitive within each region (RFSS). The National Forest Management Act and U.S. Forest Service policy require that National Forest System land be managed to maintain viable populations of all native plant and animal species. A viable population is one that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its range within a given planning area.

The objectives of this document are to:

-Provide an overview of the current scientific knowledge on the species.

-Provide a summary of the distribution and status on the species range-wide and within the Eastern Region of the Forest Service, in particular.

-Provide the available background information needed to prepare a subsequent Conservation Approach.

NOMENCLATURE AND TAXONOMY

Scientific Name: *Lonicera dioica* L. var. *douglasii* (Lindl.) Farw. [var. *glaucescens* is a later synonym]

Common Names: Red honeysuckle; Limber honeysuckle; Glaucous honeysuckle; Glaucous-leaved honeysuckle; Wild honeysuckle; Smooth-leaved honeysuckle; Douglas' honeysuckle; Mountain honeysuckle; Small honeysuckle

Synonymy: [this list is for the species *L. dioica* L. (1767) overall because of differing interpretations of the taxa]:

Lonicera parviflora Lam. (1785)

Lonicera parviflora Lam. var. *douglasii* (Lindl.) A.Gray, Manual (A.Gray) 171. (1848), basionym: *Caprifolium douglasii* Lindl., Trans. Hort. Soc. Lond. 7:244. (1830). *Lonicera parviflora* var. *douglasii* (Lindl.) Farw. (1929)

Lonicera hirsuta Eat. var. *glaucescens* Rydb. (the basionym: 1896); *Lonicera glaucescens* (Rydb.) Rydb. (1897); *Lonicera dioica* var. *glaucescens* (Rydb.) Butters (1913)

Lonicera glaucescens (Rydb.) Rydb. var. *dasygyna* Rehd.; *Lonicera dioica* L. var. *dasygyna* (Rehd.) Gleason; *Lonicera dioica* var. *glaucescens* f. *dasygyna* (Rehd.) Deam

Lonicera dioica L. var. *orientalis* Gleason

Class: Magnoliopsida (Flowering Plants - Dicotyledons)
Family: Caprifoliaceae (the Honeysuckle family)
Plants Code: LODIG [for this variety] LODI2 [for the species] (USDA NRCS plant database, W-2) http://plants.usda.gov/cgi_bin/topics.cgi

The genus *Lonicera* includes 34 species that have been reported in North America (Kartesz and Meacham 1999). These 34 species include 18 native species and 16 exotic species, some of hybrid origin. The somewhat conservative treatment presented by Kartesz and Meacham listed nine additional varieties within the 18 native species resulting in a total of 27 taxa native in the United States. *Lonicera dioica* L. was treated in that work as a variable species with no accepted varieties, and so *Lonicera dioica* 'var. *glaucescens*' = *Lonicera dioica* in that treatment.

It was recently pointed out (by K.Gandhi, pers. comm.) that if this variety is to be accepted at this rank, then the correct name cannot legally be *Lonicera dioica* var. *glaucescens* according to the

current International Code of Botanical Nomenclature [ICBN] (Greuter *et al.*,2000). According to Dr. Gandhi, if *Lonicera parviflora* Lam. var. *douglasii* (Lindl.) A.Gray and *Lonicera dioica* var. *glaucescens* are to be considered to be the same taxon, then var. *glaucescens* cannot be used because at the rank of variety, var. *douglasii* (Lindl.) A. Gray 1848 is the earlier name and has priority.

Rydberg's var. *glaucescens* was described in 1896 as a variety of *Lonicera hirsuta*, a rather distinct species. In 1897, Rydberg decided to raise the plant to the rank of species, calling it *Lonicera glaucescens* (Rydb.) Rydb. Rehder (1903) assigned *Lonicera parviflora* Lam. as a synonym of the earlier *Lonicera dioica* L., and at the same time he assigned its var. *douglasii* (Lindl.) A.Gray as a synonym of *Lonicera glaucescens* (Rydb.) Rydb. Scoggan (1957) assigned *Lonicera parviflora* Lam. more specifically as a synonym of *Lonicera dioica* var. *glaucescens* (Rydb.) Butters, but he did not comment on var. *douglasii*. One cannot use the name *Lonicera dioica* var. *glaucescens* as the correct name for the plant because of the rule of priority in the code, that, in short, states that within a given rank (such as variety) earlier (older) validly published names must be used instead of newer (younger) synonyms. Therefore, if *L. parviflora* var. *douglasii* and *L. dioica* var. *glaucescens* both refer to the same plant, then var. *douglasii* must be used because it is 48 years older.

If var. *douglasii* (= var. *glaucescens*) is considered to be an insignificant variant of *Lonicera dioica*, and if it is not accepted as taxonomically distinct from typical plants of the species, then all of these names would simply become synonyms of *Lonicera dioica* L., the earliest name at the rank of species. This decision is based upon the judgement of individual botanists based upon available evidence, and, therefore, whether to accept this plant as a distinct variety or not is not governed by the ICBN, and, instead, it is inherently a professional subjective judgement. This conservation assessment does not make this judgement, but it does attempt to present information available at both the variety and species ranks, leaving the final judgement to those who are in policy making positions regarding plant protection. The common name for the taxon is likewise quite variable in the literature. In this report, either the name 'Red honeysuckle', used by the Illinois Endangered Species Protection Board [IESPB] (2002) or the phrase 'var. *glaucescens*' will be used to refer to the taxon in question. Information in the literature that has been reported under a different scientific name will be so specified.

This taxonomic problem is ongoing. Only a few current treatments recognize this variety and it is possible that this variety will not be generally accepted to be distinct in future treatments. Furthermore, a reasonable case can be made to accept four varieties within *Lonicera dioica*, i.e., var. *dasygyna*, var. *dioica*, var. *douglasii* [= *glaucescens*], and var. *orientalis*, and all of these names are in current use. A general consensus has not yet been reached and taxonomic judgements may differ in this case for some time to come. To assist in understanding current assessments of the variety, the name in use in several commonly used floras and treatments has been included below in Table 1.

The name *Lonicera* was derived from the name of the German herbalist Adam Lonitzer (1527-1586) (see Giebelmann 2002). The honeysuckle is a well-known American, European and Asian genus with about 200 species total, and its common name was derived from its well-known heavy production of sweet nectar in the flowers. The epithet "dioica" resulted from the (erroneous) idea that this species produced male and female flowers on separate plants. The varietal epithet "glaucescens" means "glaucescent" or dull white-waxy, a feature seen on the underside of leaves of this variety but also commonly in the species overall, and the epithet 'douglasii' was meant to honor the first collector of the variety, David Douglas (1798-1834).

Table 1. The status of *Lonicera dioica* 'var. *glaucescens'* in selected literature. The additional notes exclude remarks on *Lonicera sempervirens*, the status of which has not generally been disputed.

Accepted name	References	Additional notes
Lonicera dioica L.	Radford *et al.* (1968); Smith (1978); Kartesz and Meacham (1999); Voss (1996); Cooperrider *et al.* (2001); W-2; W-3	Radford *et al.*: included var. *glaucescens* as synonym, distinguished no vars.; Smith combined *L. flava*, *L. prolifera*, *L.flavida* Cockerell, and var. *glaucescens* all into *L. dioica*; Kartesz and Meacham accepted no vars. in *L. dioica*; Voss did not mention vars., accepted *dioica* (both pubescent and not); Cooperrider *et al.* did not recognize the variety in Ohio; NatureServe and USDA Plants sites follow Kartesz.
Lonicera dioica L. var. *glaucescens* (Rydb.) Butters	Deam (1940); Steyermark (1963); Wherry *et al.* (1979); Barkley *et al.* (1977, 1986); Mohlenbrock (1986); Gleason and Cronquist (1991); Herkert *et al.* (1991); Rhoads and Block (2000); Wetter *et al.* (2001); Brown and Brown (1972)	Deam also accepted var. *glaucescens* f. *dasygyna* (Rehder) Deam; Steyermark accepted both vars.; Wherry *et al.* accepted both vars.; Barkley - accepts var. in Atlas (1977) not text (1986); Mohlenbrock accepted both vars,; Gleason and Cronquist accepted all 4 vars.; Rhoads and Block accepted 3 vars.; Wetter *et al.* accepted both vars.; Brown and Brown accepted both varieties

DESCRIPTION OF SPECIES

Lonicera dioica 'var. *glaucescens*' is a native perennial fibrous shrub-like vine that has also been described as a climbing shrub, the stems are generally (1-) 1.5-2 (-3) m long, the leaves are opposite, simple, entire, 5-12 cm long, variable in shape (usually rounded to elliptic), and their lower surface is conspicuously whitened or silvery-blue and also sparsely to densely evenly

pubescent (villous with very narrow hairs); the uppermost leaf pair at the base of the terminal flower cluster (inflorescence) is joined (fused, connate) at its base into a disc through which the stem continues (perfoliate), and the tip of each connate leaf is narrowed to an obtuse, somewhat acute, or rounded and mucronate tip. The upper surface of this disc is green and not glaucous (not whitened with a waxy covering) and the disc is longer than broad, oblong, elliptic, or diamond shaped (rhombic or doubly ovate); the flowers are arranged in 1-3 crowded whorls (in circles around the axis) that are usually not separated from one another; the corolla tube is slightly enlarged on one side at the base (gibbous), it is generally both glandular and villous-hairy on the outside and hairy inside, the color is usually rose or brick-colored or yellowish or greenish-yellow tinged with purple, the flower is small, 1.5-2.5 cm long, and the tube is as long as or slightly longer than the lobes (lip). The style is hirsute. The fruits are globose reddish-orange berries. The chromosome number is $2n = 18$ (adapted primarily from Steyermark 1963 and Gleason and Cronquist 1991).

This variety is sometimes difficult to distinguish from several similar taxa, and so it is often not recognized to be distinct by botanists. Much sterile material cannot be identified with certainty particularly after being heat-dried, because the waxy coatings important in identification can be destroyed by this process. Features of the connate inflorescence bracts (disc) are generally important in distinguishing the species, and these also are usually not present on sterile material. An identification key is provided below for this and similar taxa known in Illinois and neighboring states. This key has been expanded from those found in most current treatments in which 'var. *glaucescens*' is recognized because of the difficulties in identification in this group. The additional detail may be helpful in distinguishing the taxa; it was based primarily on keys in Steyermark (1963) and Gleason and Cronquist (1991).

Schwegman (1970) in his first report for the variety in Illinois provided an excellent summary of the distinguishing characters: "It is easily distinguished from the other native honeysuckles in Illinois by its gibbous corolla which is both hairy and glandular outside. Leaves are both strongly whitened and densely pubescent beneath."

Key to Illinois species of *Lonicera* that are: vines or viny shrubs, stems hairless, leaves never lobed, sometimes wider towards apex than base, uppermost leaf pair subtending inflorescence connate, flowers at branch tips in opposite 3-flowered cymules producing 6 flowered whorls.

1. Corolla not two-lipped, the 5 lobes nearly equal and much shorter than the tube, the base of the tube not swollen on one side, stamens and style barely protruding, corolla tube glabrous, narrow, showy, usually deep red (or yellow) outside, yellow inside, (2.5-) 3-5 cm long; flower whorls 1-4, separated from one another; bracts green above, glaucous beneath, rhombic-elliptic, relatively small (commonly 2 cm X 2 cm, emarginate); leaves glabrous and conspicuously glaucous beneath; often cultivated.....*Lonicera sempervirens* L. var. *sempervirens*

1. Corolla strongly two-lipped (bilabiate, bilateral), the 5 lobes not all equal in size or shape, shorter or almost equal in length to the tube, the base of the tube swollen on one side (gibbous) or not, stamens and style conspicuously protruding, corolla tube glabrous or pubescent, gradually or more abruptly expanded

towards apex, showy or not, pale yellow-green, yellow, orange, rose, purplish, or reddish, 1.5-3.5 cm long; flower whorls 1-6, crowded or separated from one another; bracts green or conspicuously glaucous above, green or glaucous beneath; infrequently cultivated.....2

2. Upper and lower surfaces of connate bracts conspicuously glaucous (may not be visible in heated specimens), generally the disc length = width (circular) or wider than long; bract leaves rounded or emarginate (retuse) at the apex; leaves glaucous beneath, variably pubescent below, pubescent with short flat (or blister-like) white hairs on the surface with or without some spreading hairs on the midrib and main lateral nerves, less frequently essentially glabrous; flower whorls 2-6, normally separated from one another, rarely only 1; corolla tube glabrous on outside, gibbous at base, corolla pale yellow.....*Lonicera reticulata* Raf. (=*Lonicera prolifera* (Kirchn.) Rehd.)

2. Upper surface of connate bracts not glaucous, normally pale or dark green, lower surface glaucous or not, the disc length = width (circular) or longer than wide, sometimes diamond-shaped (rhombic); bract leaves rounded, emarginate, pointed, or mucronate at the apex; leaves glaucous or not beneath, pubescent or glabrous, hairs if present not short and flat; flower whorls 1-3, congested; corolla tube glabrous, glandular, and/or pubescent on outside, gibbous or not at base, corolla orange, greenish-yellow, yellow, pale yellow, sometimes reddish or purple.....3

3. Corolla orange, orange-yellow, to pale yellow but lacking purple, rose, or brick color, 2-3 cm long; corolla tube not gibbous at base, glabrous, normally as long as the petal lobes (lips); leaves and connate bracts not glaucous but can be pale or grey-green beneath; connate bracts usually rounded or blunt at apex; lower surface of leaves glabrous or with spreading hairs on the midrib; southern 1/4 of Illinois.....*Lonicera flava* Sims (3a)

3a. Corolla orange or orange-yellow, usually 2.8-3 cm long.....*Lonicera flava* var. *flava*

3a. Corolla pale yellow or cream-colored, usually 2-2.5 cm long.....*Lonicera flava* var. *flavescens* Gleason (= *Lonicera flavescens* Small)

3. Corolla red, or yellow, pale yellow, to yellow-green tinged with purple, rose or brick-color (some reddish or purple color present in flowers), (0.6-)1.5-2.5 cm long; corolla tube gibbous at base, glabrous, glandular, and/or pubescent on outside, longer than petal lobes (lips); leaves and connate bracts conspicuously whitened-glaucous beneath; connate bracts usually narrowed to tip and pointed or mucronate, less frequently rounded; lower surface of leaves glabrous or uniformly villous-hairy beneath; northern 1/3 of Illinois, but rarely south.....*Lonicera dioica* L. (3b)

3b. Leaves glabrous beneath; corolla tube and style glabrous or sparsely hairy.....*Lonicera dioica* var. *dioica*

3b. Leaves uniformly (sparsely or more densely) villous-hairy beneath; corolla tube normally glandular and villous, style hirsute.....*Lonicera dioica* var. *douglasii* (Lindl.) Farw. [= var. *glaucescens* (Rydb.) Butters]

One should note that the var. *orientalis* Gleason, found east of Illinois, has a glandular but not hairy hypanthium (loosely defined here as the outside surface of the ovary), the var. *dasygyna*

(Rehder) Gleason, known in Indiana and Ohio, has both glands and longer hairs on the hypanthium, and the 'var. *glaucescens*', as presented here, has a glabrous hypanthium. All three varieties seem to have at least a glandular and /or hairy corolla tube, but the hypanthium feature is variable, and it may not be useful in Illinois. This is an important part of the problem in defining these varieties.

The red, fleshy berries of the Red honeysuckle are undoubtedly dispersed by birds, as in many other species of the genus. Their edibility to humans is unknown. A perusal of the Internet and the literature can result in information that varies from advice on how to make Honeysuckle jam and jelly (W-4) to strong warnings of toxicity (W-5). It appears that there is either great variation in the fruits within the genus or a great deal of unsubstantiated information available. No references were found for this particular variety regarding its edibility or toxicity. An inquiry was sent to the website that presented the recipe for jam and jelly (W-4) and a reply was received from Ernestina Parziale (earthnotes@attbi.com) as follows: "That recipe was given to me many years ago. I posted it for those who were interested, but have no further information on it. Four varieties are mentioned: *L. tatarica* which grows from Maine south to Kentucky, *L. canadensis* which grows from Canada through New England and west to Minnesota, *L. oblongifolia* which is found in New Brunswick south to Pennsylvania and west to Minnesota, and *L. caerula* which is wide ranging enough to be found in Alaska."

HABITAT AND ECOLOGY

The preferred habitat of the Red honeysuckle appears to vary, especially at the northern and southern portions of its range. Nationally, *Lonicera dioica* overall has been characterized as a facultative upland (FACU) wetland plant in regions 1-6, including Illinois (within Region 6), but not in regions 7 to H, west of Illinois (W-6). This indicates that it is an upland plant that may occur in wetlands 1-33 % of the time, but that it grows in upland habitats at most sites.

In the northern portions of its range, the Red honeysuckle has been reported to occur in the moist or wet soils of swamps and bogs, particularly in northern white cedar (*Thuja*) swamps, as well as in moist to dry forest and rocky sites in the lowland and montane zones. The forests in which it occurs are usually open, and they can be coniferous and/or deciduous. The species is especially characteristic of borders and clearings, thickets, banks and rock outcrops, old dunes and fencerows (Voss 1996). In the Great Plains (Barkley *et al.* 1986) the habitat has been described as wooded hillsides or brushy stream banks. In Wisconsin, where it is rather common, 'var. *glaucescens*' can be found mostly in open woodlands or at the margins of mixed forests on steeply sloping banks with sandstone outcrops, bluffs or cliffs along streams in sandy soil. The site exposure is generally described as northern (most frequently), or eastern, or western. Moisture conditions can vary from moist to dry depending on the season. The soil in which it grows is generally sandy, or sandy with a periodically moist humus layer on its surface, and rarely sandy clay. The species appears to occur in somewhat acidic soils, but it has also been found in thin soils over limestone outcrops.

Among the characteristic habitats described on Wisconsin herbarium specimen labels are the rocky shores of rivers, along lake shorelines, at edges of moist woods, at upper beaches, on steeply sloping densely wooded river banks, in clearings, on an open cliff top (igneous), at a small prairie on a wooded hillside, in uplands, and on dry wooded slopes.

Towards the south, the Red honeysuckle tends to be restricted to the margins of rock outcrops, particularly those of sandstone bluffs. In Indiana, Deam (1940) described its habitat as moist soil of swamps and bogs in the northeastern part of the state but on wooded bluffs generally along streams towards the south. In Missouri, the Red honeysuckle occurs along wooded bluffs and ledges, alluvial forests, rocky banks of streams, and thickets (Steyermark 1963); the typical variety (var. *dioica*) has been found along and hanging-over the tops of north-facing ledges of bluffs (limestone) along creek drainages and springs. In Illinois, the habitat for 'var. *glaucescens*' has been described as: "the edge of an east-facing sandstone ledge which overhangs the trail into Little Grand Canyon" (Schwegman 1970), and the top of sandstone bluffs with a west-northwest exposure in shade at Fountain Bluff (Mohlenbrock and Wilson 1985, and pers. obs.).

The tendency for this and other similar native honeysuckles to be restricted to areas near exposed rock outcrops may be the result of their dependence on birds as the primary means of flower pollination and seed dispersal. It is well known that the native honeysuckles are very dependent on hummingbirds for pollination (Pojar 1975), the species *Lonicera sempervirens* having an extreme example of a flower that can be pollinated by little else because of its long narrow red tube. Hummingbirds require open areas to fly and also to see brightly colored red, orange, or yellow flowers. The showy flowers of these honeysuckles would be less likely to be pollinated if hidden in shade. Furthermore, the brightly colored red or orange fruits of these vines are sought out by fruit-eating birds, and the fruits must be exposed to be easily found. The honeysuckles, generally preferring moist, well-oxygenated soils, must become established on a site that is exposed, oxygenated or well-drained, and, yet, has sufficient moisture. This type of site becomes scarce in warmer climates where wetlands tend to be poorly oxygenated and exposed sites tend to be very dry. Therefore, the southern habitats for plants such as the honeysuckle must possess some or all of the following characteristics - 1) the slopes must have mosses or soils (such as humus) that have water storage capabilities, 2) they must have dependable sources of water, such as rather frequent rainfall during the growing season, or crevices where persisting water can be sought out by the roots, 3) the slopes must have areas of shade available for vegetative parts of the plants to thrive and not dessicate from intense summer exposure, and 4) the slopes must also offer areas where flowers and fruits can be exposed for passing birds to find. Because honeysuckles are short vines that generally cannot grow high into the canopy of trees, suitable habitats are limited. In northern areas where wetlands tend to be better oxygenated and more open, and where woody plant growth is generally shorter or slower than in the south, honeysuckles appear to find more habitats available.

The plant communities and plant associations within which the Red honeysuckle grows also vary in different portions of its range.

Specimen labels at the University of Wisconsin herbarium listed numerous associated species for this vine. Specific associations of dominant plants listed included: pine forest, mixed oak - white pine forest, oak-basswood forest, basswood-maple-paper birch-oak forest, and sugar maple - beech - oak - hemlock forest. Associated plants in Wisconsin included ("*" indicates the most commonly listed associates) the trees **Acer saccharum*, **Betula papyrifera*, **Fagus grandifolia*, *Fraxinus* sp., *Hamamelis virginiana*,**Ostrya virginiana*, *Picea glauca*, *Pinus banksiana*, *Pinus resinosa*, **Pinus strobus*, *Populus deltoides*, *Populus tremuloides*, **Quercus alba*, *Quercus ellipsoidalis*, *Quercus macrocarpa*, *Quercus velutina*, *Tilia americana*,**Tsuga canadensis*, the shrubs *Cornus rugosa*, **Diervilla lonicera*, *Prunus virginiana*, *Rubus* sp., *Symphoricarpos albus*, *Vaccinium angustifolium*, *Vaccinium myrtilloides*, *Viburnum rafinesquianum*, the vines **Celastrus scandens*, *Dioscorea villosa*, *Smilax hispida*, the herbs *Arabis laevigata*, *Aralia nudicaulis*, *Aralia racemosa*, *Arenaria lateriflora*, *Galium boreale*, *Prenanthes alba*, *Ranunculus abortivus*, *Uvularia grandiflora*, the ferns *Cystopteris protrusa* and *Polypodium virginianum*, and the grasses *Elymus hystrix*, and *Panicum latifolium*.

Many of the associated species in Wisconsin prefer acidic soils, but a few in the list (*e.g. Acer saccharum*, *Celastrus scandens*, *Tilia americana*, *Viburnum rafinesquianum)* prefer high or neutral pH soils. The availability of water may be more significant a factor than pH, as suggested previously. As one proceeds south, several of the species associates common in the north become rare and are no longer associated with the Red honeysuckle (*e.g.*, *Betula papyrifera*, *Picea glauca*, *Quercus ellipsoidalis*, *Vaccinium myrtilloides*).

In Illinois, the plant community in which the Red honeysuckle grows has been described as a mesic upland forest at its margin or transition with the Sandstone Cliff Community (as defined by White and Madany 1978). Dominants in the community can include *Quercus alba*, *Quercus rubra*, and *Quercus velutina* along with *Juniperus virginiana*. Additional associated species at the Little Grand Canyon site included *Heuchera* sp., *Lonicera japonica*, *Hydrangea arborescens*, *Parthenocissus quinquefolia*, and *Dryopteris marginalis*. According to Mohlenbrock and Wilson (1985) some of the additional associates restricted with this honeysuckle to the sandstone cliffs at the Fountain Bluff site include the tree *Fraxinus quadrangulata*, the Illinois endangered shrub *Berberis canadensis*, the herbs *Aquilegia canadensis* and *Campanula rotundifolia*, the ferns *Asplenium pinnatifidum* and *Pellaea glabella*, and the grass *Muhlenbergia racemosa*. The dominants at that site include the trees *Quercus* spp., *Carya* spp., *Celtis occidentalis, Ostrya virginiana* and *Prunus serotina*, the shrubs *Vaccinium arboreum* and *Vaccinium pallidum* (= *vacillans*), the herb *Solidago drummondii*, and the fern *Polypodium virginianum*.

The southern Illinois plants were found growing precariously at the edges of sandstone cliffs in dry woodlands in Jackson County (Mohlenbrock and Wilson 1985). Botanists and ecologists have speculated on the original landscape in this part of Illinois based mostly upon land survey records and field observations (Eric Ulaszek, pers. comm.). Evidence suggests that the original pre-settlement landscape was a 'barrens', a savanna or prairie-like community with scattered oak trees and oak brush, that was periodically burned by Native Americans. The Jackson County sites

are within the Greater Shawnee Hills Section of the Shawnee Hills Natural Division of Illinois (Schwegman *et al.* 1973, Herkert *et al.* 1991).

DISTRIBUTION AND ABUNDANCE

Lonicera dioica (the species) overall is found in much of the United States (31 to 33 states) east of the Rocky Mountains, except for the more southern Gulf Coast states, and it also occurs in much of Canada (in 7 or 8 provinces) (W-3 indicates 33 and 7; Kartesz and Meacham (1999) indicates 31 and 8, respectively). According to the Nature Conservancy's NatureServe Internet site (W-3) the species occurs in Alabama and Delaware, but Kartesz and Meacham (1999) did not include it in those states. In Canada, NatureServe does not include the species in the Yukon, but Kartesz and Meacham (1999) do so; otherwise the two geographic lists appear to match regarding the species' distribution.

Reports of the species in Alabama appear to be in error. Specimens from the state could not be located, and it is not included on the state plant list (Ginzbarg, pers. comm). In Arkansas, the concept for the species has been broadened even further to include the similar species *Lonicera reticulata* Raf. (= *L. prolifera* (Kirchn.) Rehd.) and *L. flava* Sims. This is a very broad species concept, and so the distribution map provided by Smith (1978) is of no use in distinguishing the narrower concept of the species in that state. A review of all Arkansas herbarium material would be needed to determine which taxa are there. Steyermark (1963) did record *L. dioica* var. *glaucescens* (under this name) in Taney County, Missouri, which borders Arkansas, and so it could occur in that state. The species may not occur in Oklahoma. It was reported from the state by Gleason and Cronquist (1991), Kartesz and Meacham (1999), and the USDA Plants Internet site (W-2), but no specimens from the state are known to the Oklahoma botanists who were contacted (Hoagland and Elisens, pers. comm.) during the course of this investigation.

The range of 'var. *glaucescens*' is not always easily distinguished from that of the typical variety because of the major differences of opinion on its status as a variety. Many state maps do not distinguish the varieties within the species and so are of limited use in this regard. When this information is available and when specimens are examined, it appears that 'var. *glaucescens*' is restricted to the western portion of the range of the species from Ontario, Michigan, and Illinois, westward. Specifically, this honeysuckle variety has been reported in 17 states, namely, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Carolina, North Dakota, Oklahoma, Ohio, Pennsylvania, South Dakota, Wisconsin, and Wyoming. It may also occur in Arkansas and Tennessee, but this has not been confirmed. In Canada it has been reported from seven provinces, namely, Alberta, British Colombia, Mackenzie, Manitoba, Ontario, Saskatchewan, and Yukon. Representative specimens of this vine (as 'var. *glaucescens*') have been listed in Appendix 1. A summary of its known distribution in the United States has been presented in Appendix 2. Additional details on the distribution of the Red honeysuckle can be found in the references cited within Appendix 2.

In Illinois, the Red honeysuckle has been reported at only two sites from southwestern Illinois in Jackson County at the Little Grand Canyon, about 6 miles southwest of Murphysboro, and from Fountain Bluff, immediately southeast of the village of Gorham. It was discovered at the Little Grand Canyon by John Schwegman (1970) in 1969. This population has been described as a southern disjunction for the variety (Herkert *et al.* 1991). In his publication, Schwegman described his plant, which was in flower, as having a "gibbous corolla which is both hairy and glandular outside. Leaves are both strongly whitened and densely pubescent beneath" and these are features that, in this combination, are unique to this variety. It has also been reported not far distant in Perry County, Missouri, about 30 miles to the northwest of this site. Mohlenbrock and Wilson (1985) later reported an additional site for 'var. *glaucescens*' from the top of sandstone bluffs at Fountain Bluff, Jackson County. I visited both sites with Mark Basinger and Ariane Hoard in July 2002 and collected vouchers of both plants, which were sterile. Only one individual appeared to be present at each site, but this is not certain (see Research and Monitoring, below). Both specimens appear to belong to the same taxon. What that taxon is, however, could not be readily determined from the sterile specimens. Neither specimen demonstrates the conspicuously glaucous leaf undersurface typical of *Lonicera dioica*, and the leaves are relatively large and obovate, more like leaves of *Lonicera flava* or *Lonicera reticulata* (= *prolifera*), as I understand them, than those of *L. dioica* 'var. *glaucescens*' from states north and west of Illinois. To further complicate this situation, *Lonicera flava* was reported from the same area (T9S, R4W, SW1/4, SE1/4 Sect. 36) on Fountain Bluff, "on top of a sandstone cliff", by Don Kurz in May 1978, and it was also reported on the ledge of the chute going down into Little Grand Canyon by Keith Wilson in July 1973 (Illinois Department of Natural Resources 2002). Until specimens can be re-evaluated or until the plants are again seen in flower, it is uncertain what species truly occurs at these two sites, although Schwegman's description is very convincing.

John Schwegman (pers. comm.) has provided an interesting comment regarding the association between the Illinois endangered native American barberry and the Red honeysuckle: "One other observation on *Berberis* in the midwest is that it appears to be a relic of a widespread plant association inhabiting the midwest in the past, probably in the Mesophytic Maximum after the close of the Pleistocene but before the onset of the Xerothermic period. Two relic species from this association now consistently occur together as relicts. These are *Campanula rotundifolia* and *Lonicera dioica* var. *glaucescens*. They occur together at Spring Lake, Fountain Bluff, and Jam Up Bluff on the Jacks Fork River in the heart of the Missouri Ozarks and are absent from the rest of Missouri."

Swink and Wilhelm (1994) included some remarks on Red honeysuckle, including both *Lonicera dioica* and its 'var. *glaucescens*' in the Chicago area (including portions of Wisconsin and Indiana). Comments on the variety were as follows (p. 473): "Var. *glaucescens* (Rydb.) Butters, a form with pilose styles and flowers 1.5-2 cm long and with pubescent lower leaf surfaces, is known from the region, but the characters merge insensibly with the typical variety." Regarding

its frequency, they stated that the species is occasional in woods, and that it is common on ravine crests in Lake County, Illinois, and Racine County, Wisconsin.

Botanists generally believe that most native plants have reached the limits to which they can travel under present conditions of climate (that is, temperature and rainfall), substrate, dispersal mechanism, and other pertinent factors. In other words, species are in balance with their environment as long as the environment is stable. In many biological simulations, however, ecological extremes are more important than the means in controlling plant distribution (Webb *et al.* 1975). An obvious example is that of frost tolerance (temperature extremes). A plant species completely intolerant of freezing can persist in a site indefinitely until the first time extreme temperatures cause it to freeze. One such freeze in a century may be enough to eliminate a species entirely from a wide area of its range, and changes in climate historically have caused the greatest changes in plant distributions (see Hill 2003a). In the case of *Lonicera dioica* 'var. *glaucescens*', historic and current northern distribution appears to be dependent primarily on hydrology, substrate type, and the openness of the habitat rather than from temperature extremes alone. Nevertheless, its historical distribution suggests that it is not adapted to extreme heat or drought. The current very limited distribution in the southern portion of its range suggests that it may be unable to increase its range further south despite its effective avian dispersal.

PROTECTION STATUS

The protection status of *Lonicera dioica* 'var. *glaucescens*' has not been evaluated in most states where it occurs because of differing opinions on whether it is a 'good' variety or not. Illinois is the only state in which the variety has been listed for protection under this name, and it is considered to be Endangered in that state (Herkert *et al.* 1991, IESPB 2002). In Nebraska, the variety is being tracked by the Natural Heritage Program but it is without protection status (W-3). In Kentucky, *Lonicera dioica* var. *orientalis* Gleason has been listed as Endangered. In Tennessee, the species overall has been listed to be of Special Concern, and in Maine it has been listed as Endangered; in these two cases, however, the listing probably refers to var. *dioica* in the strict sense because 'var. *glaucescens*' has not been confirmed to grow in either state. In Georgia, the species has been listed, but with no status assigned.

The state protection rankings vary for the same reasons as stated above. Official protection for the species and varieties of *Lonicera dioica* outside of Forest Service lands depends upon state and local laws because they are not listed as Federally threatened or endangered. Their taxonomic and nomenclatural status will probably require further review in states where they grow. Living plants and preserved herbarium specimens would require re-examination to determine if the varieties occur in the state and to determine if any should be recognized nationally or regionally. In Illinois, for example, a decision by the Illinois Endangered Species

Protection Board (IESPB) to merge all varieties of *Lonicera dioica* into the broader species concept would result in its removal from the state list of protected plants.

The Nature Conservancy currently lists the species overall as a G5 plant (W-3), indicating that the species is secure world-wide, in its opinion. In the United States the species is given the National Heritage rank of N5 (for similar reasons). However, the varieties have not been accepted and /or evaluated by either protection ranking system, and so their global and national rankings are the same as for the species overall when they are accepted as distinct.

The Red honeysuckle is included on the Regional Forester Sensitive Species list (RFSS) for the Shawnee National Forest but not the Hoosier National Forest.

In Missouri, *Lonicera dioica* 'var. *glaucescens*' is not being tracked and its taxonomic status is uncertain at present, though Steyermark accepted it as a variety within the state (Yatskievych, pers. comm.; Steyermark 1963).

Table 2 lists the official state rank assigned by each state's Natural Heritage program according to the Nature Conservancy at their Internet site (W-3). Appendix 3 explains the meanings of the acronyms used (W-7).

A summary of the current official protection status for the Red honeysuckle follows, along with the name under which it is protected (if any) stated:

U.S. Fish and Wildlife Service:	Not listed (None).
U.S. Forest Service:	Region 9, Sensitive (Illinois only, Shawnee National Forest) [as *L. dioica* var. *glaucescens*]
Global Heritage Status Rank:	G5 [as *L. dioica*] G5T5 [as 'var. *glaucescens*']
U.S. National Heritage Status Rank:	N5 [as *L. dioica*]
Canada National Heritage Status Rank:	N5 [as *L. dioica*]

Table 2: S-ranks for *Lonicera dioica* in the United States [Heritage identifier: PDCPR03080]. Variety present in state indicated, if known. See discussion of varieties presented in the section on Distribution and Abundance.

State	Heritage S-rank	State	Heritage S-rank

Alabama	S? [but *L. dioica* not known in the state]		only]
		New Hampshire	SR [var. *dioica* only]
Arkansas	SR [present ? var. ?]	New Jersey	S3S4 [var. *dioica* only]
Connecticut	SR [var. *dioica* only]	New York	SR [var. *dioica* only]
Delaware	SU [present ? var. *dioica* only?]	North Carolina	S2 [var. ?]
		North Dakota	SR ['var. *glaucescens*' only]
Georgia	S1 [var. ?]		
Illinois	S? [> one var.]	Ohio	SR [> one var.]
Indiana	SR [> one var.]	Oklahoma	SR [present ? 'var. *glaucescens*' only ?]
Iowa	S4 ['var. *glaucescens*' only?]	Pennsylvania	SR [> one var.]
Kansas	SR ['var. *glaucescens*' only]	Rhode Island	S1 [var. *dioica* only]
		South Dakota	SR ['var. *glaucescens*' only]
Kentucky	S? [var. ?]		
Maine	S1 [var. *dioica* only]	Tennessee	S2 [var. ?]
Maryland	SR [var. *dioica* only]	Vermont	S4 [var. *dioica* only]
Massachusetts	SR [var. *dioica* only]	Virginia	SR [var. *dioica* only]
Michigan	S? [> one var.]	West Virginia	S? [var. *dioica* only]
Minnesota	SR [>one var.]	Wisconsin	SR [> one var.]
Missouri	S3 [> one var.]	Wyoming	S2 ['var. *glaucescens*' only]
Nebraska	S4 ['var. *glaucescens*'		

LIFE HISTORY

As previously stated, the Red honeysuckle is a perennial fibrous vine or climbing shrub with yellowish to distinctly rose-colored flowers and globose reddish-orange berries, and it has leaves that are sparsely to densely villous-pubescent and glaucous (pale-waxy) beneath. The stems of this and other species of viny honeysuckles will readily root when in contact with moist organic soils, and so it may be difficult to determine how many individuals are present where it occurs. These roots appear to be rather weak or shallow, but they can occur wherever the sprawling stems contact moist soil. This species is not aggressive, stems are usually few, and each site may have only a single individual. The stems could break apart after rooting, so that several individuals may appear to be present. The plants are deciduous and dormant in the winter. The leaves normally emerge in late March or April, perhaps as late as May in the coldest parts of its range.

Honeysuckles primarily reproduce sexually by means of flowers and seeds. The flowering period is May-June, depending upon location, often for only a brief period. In Illinois the flowers appear to be at their peak at about 15 May, on average. In Wisconsin, the peak may be shifted to about 20-25 May. Reported pollinators include ruby-throated hummingbirds, and it is thought the species has a mixed transitional pollination strategy, being pollinated also by insects such as bumblebees (Pojar 1975). The flowers of this and other honeysuckles often darken with age or after pollination. The fruits, fleshy to sticky inside, are globose reddish-orange berries, and they are produced in June-July and can persist longer. They normally do not fall, but are either picked off by birds or they dry on the plant.

There is some evidence that the Red honeysuckle may hybridize with other native honeysuckle species. This, if proven, could help explain the difficulties in identifying and separating the taxa in southern Illinois. This subject will be reviewed in greater depth in a conservation assessment for *Lonicera flava* Sims currently under preparation by Hill (in prep.).

POPULATION BIOLOGY AND VIABILITY

Not a great deal is known of the Red honeysuckle's population biology beyond what was described in the previous section. The plant is most likely overlooked because it is only infrequently seen fertile and it may be dismissed as 'just another Japanese honeysuckle' by amateurs and professionals alike. In southern Illinois, the plants do not appear to produce very many fruits in a given year, and in dry years they may not produce fruits at all. None were seen on the plants visited in the summer of 2002, which was a drought year. It is also possible that the stems in some populations are all clones of a single individual. If this is true, this could help explain the limited amount of fruit and seed production, because fertility is generally reduced in inbred populations through the process of autogamy (self fertilization). Autogamy is useful to the plant when there are small numbers of individuals per area, since the safeguarding of the success of propagation is more important than the production of new genotypes. In primary habitats (such as rock outcrops) that are generally poorly vegetated, initial success is very important. During subsequent periods of vegetation increase, pioneers are often substituted by other, more competitive species (W-8).

Maintaining the open habitat in which the Red honeysuckle grows is one of the most important means to insure the viability of this plant in southern Illinois and elsewhere at its southern limits of range where suitable habitat is so scarce.

In Illinois, the overall species viability for *Lonicera dioica* has been considered secure because it is said to be more common in the northern part of the state (Swink and Wilhelm 1994). However, when herbaria were examined for representative specimens of the species and

varieties, very few specimens were found that had been collected in Illinois. The viability of the few southern populations of 'var. *glaucescens*' is uncertain, but likely poor. The very few known existing plants (possibly only 2 individuals) are spatially distant from one another and do not seem to be very reproductive. This fits the profile of relict species that are very vulnerable because they are very restricted to uncommon habitats, they are at the margin of their range, and there are very few individuals. There appears to have been no management for the plant at the two sites and it also may have declined because of either too much shade or, just as likely, from excessive heat and dessication, or because of some unknown factor. Part of the pessimism concerning its future survival arises because the Red honeysuckle habitat in southern Illinois has been observed to be steadily degrading (see Potential Threats below). It may or may not occur at other suitable sites in the southern portion of the state, but few searches have been made specifically for the Red honeysuckle in recent years here or even elsewhere farther north. Suitable habitat for the variety appears to exist in several parts of the state, especially in the Chicago area, but the taxonomic problems may have resulted in a lack of conservation interest in the plant (see Swink and Wilhelm 1994). Additional searches are suggested throughout the state for this variety to allow a better assessment of its frequency. If individuals are relocated in southern Illinois, or if new sites are found, they may persist with proper habitat management.

POTENTIAL THREATS

Globally, this species has been judged to be secure because of its wide distribution and many extant populations particularly in the northern portions of its range. The same can be said for the 'var. *glaucescens*'. Herbarium records suggest that, in the United States, the variety is especially common in Wisconsin and Minnesota. As one proceeds south in its range, fewer populations can be found, and it disappears completely before reaching the Gulf coastal plain. The populations nearing the southern margin of its range are threatened and vulnerable.

In southern Illinois and elsewhere at the range margins, threats to the Red honeysuckle appear to fall into several categories, any of which could result in its extirpation in the state because of the extremely low numbers of individuals. All are serious, but none can be said to be the single most serious threat. A single chance natural disaster at either site where the plant is known could extirpate the variety from that site, and accidents at both sites could eliminate it from the state completely because of its low numbers.

The plants are located at the margins of precipitous sandstone ledges and cliffs. Normally, there is very little human traffic on these particular cliffs in Illinois; however, because cliff climbing is increasing in popularity, the plants could be extirpated by even a small amount of this type of recreational activity in their immediate vicinity. It would be tempting to grasp onto the plants for

support, but they are very weakly rooted, so that they could be pulled out and destroyed very easily by careless climbers.

Herbicides pose an additional threat to the few plants remaining. The population at the Little Grand Canyon is located along a popular hiking trail, and there is Japanese honeysuckle also present along this trail. A careless application of herbicide to the plants could extirpate them. The Fountain Bluff population is on high bluffs adjoining and facing extensive agricultural fields. Herbicide drift could destroy these plants under certain circumstances. An additional potential threat to the Red honeysuckle in southern Illinois is the government's barberry eradication program which also involves herbicides. This program has been described briefly by Hill (2003b). The Red honeysuckle has been shown to grow in association with *Berberis canadensis* at one of its two known sites. Because the U.S.D.A.'s program uses herbicides to eliminate this rare native shrub, this barberry eradication effort should not be instituted in southern Illinois if these species are to survive.

At both extant sites, the surrounding vegetation has not been thinned or burned in the recent past. It is possible that the plants may be too shaded to successfully reproduce. While vegetative growth is continuing, this will not insure long term viability. However, it is not known how much thinning, if any, might be needed to allow these plants to successfully reproduce. Related to this, a very serious potential threat is from competition with the very invasive related exotic vine Japanese honeysuckle (*Lonicera japonica*) that increases with disturbance and which is also readily dispersed by birds throughout the landscape. This exotic vine grows at an extremely rapid rate compared to the generally slow growing Red honeysuckle in southern Illinois, and a colony of the exotic could easily overwhelm it and destroy it. Because herbicide control is out of the question, and because fire can actually benefit the Japanese honeysuckle, any individuals of this exotic and invasive species should be removed by hand on a regular basis, a very labor-intensive, but necessary, activity.

The loss or degradation of primary habitat may have played a role in the demise of this species as it has in the case of *Berberis canadensis* (W-3). The elimination of the natural fire regime throughout most of its historic range has resulted in the succession of savanna and open woodland habitats into closed-canopy woodlands. In the absence of fires, *Lonicera dioica* 'var. *glaucescens*' in southern Illinois, like the American barberry, can persist today only at sites with extremely shallow soils at the margins of outcrops where there is an open exposure. Since settlement, much of the previously available habitat has been destroyed, converted to cultivated fields, or has succumbed to land development and urbanization (W-3). While it can not be demonstrated that the Red honeysuckle was any more common at the time of settlement than it is now, the amount of available fire-influenced habitat has certainly decreased in the past 150-200 years.

While mining, quarrying, and grazing would pose significant threats to this and many other cliff-face plants in southern Illinois, none of the extant populations appear to be affected by these activities currently. In addition, herbicide and sediment runoff and erosion from above do not appear to be threatening the plants at their two known sites. If the forest above the plants were to be cut or if land use changes, runoff and erosion could extirpate these plants.

It is generally believed among biologists that habitat fragmentation also can have profound effects on the success and persistence of local populations. Any activities that result in barriers to dispersal, such as developments, clearcuts, road/utility line corridors, and mined areas may limit the possibility of population expansion and genetic exchange in many species. Deleterious effects of fragmentation could possibly go unnoticed for a long period of time, making the short term effects on species viability less apparent, particularly in such a rarely-seen southern Illinois species as *Lonicera dioica* 'var. *glaucescens*'. Over time, as populations become increasingly more isolated, the effects of fragmentation can potentially be observed at the molecular level by reduced genetic frequencies caused by random drift (Barrett and Kohn 1991). When one is considering populations that are already isolated, as in the case of the Illinois populations, random genetic drift may have already occurred and may have caused negative effects to the species.

At the current time, it appears that the populations of *Lonicera dioica* 'var. *glaucescens*' in the Shawnee National Forest are very vulnerable to extirpation from a number of potential threats that could happen at any time. The extremely small number of known extant individuals suggests that a single event at either site could eliminate the variety from that site.

RESEARCH AND MONITORING

The primary problem to be solved at this time is to determine which taxa are actually present in southern Illinois. The Illinois Natural Heritage database and previous reports in the files of the IESPB have conflicting reports. According to these notes, plants identified as *Lonicera dioica* var. *glaucescens* were collected in Jackson County at Fountain Bluff by K. Wilson, and from an east facing ledge at the head of the trail down into the Little Grand Canyon natural area by J. Schwegman (specimens at SIU). *Lonicera flava* Sims, also listed as endangered in Illinois (IESPB 2002), has been reported in Pope County in the vicinity of Lusk Creek Canyon and Belle Smith Springs and in Randolph County in the vicinity of Swayne Hollow, where Red honeysuckle has not been found. However, it has also been reported in Jackson County from the same two sites at which the Red honeysuckle has been reported. So, both taxa have been reported at both sites, yet it is unlikely that both actually occur at both sites. For the purposes of this assessment, however, it has been assumed that all of these reports are correct. This problem remains unresolved until more field work and specimen examination can be conducted.

Based upon a survey of the literature, little research appears to have been conducted on this variety. The taxonomy has not been settled, there seems to be a continuing problem regarding both the nomenclature and status of the variety, as has been discussed above. Decisions on its nomenclatural and taxonomic status should be settled by the appropriate boards and agencies before most other concerns can be addressed. Additional basic research and monitoring is needed regarding *Lonicera dioica* 'var. *glaucescens*' in areas other than taxonomy. The basic data on the location of extant populations is sparse, and the two known sites should be methodically re-surveyed. Similar suitable habitat should be explored for the plant. There is also a need to monitor and assess its optimal habitat needs and to determine what management techniques might be effective in insuring its survival. The searches should be coordinated with surveys of populations in the other parts of Illinois where the species is known to occur to be certain that the circumscriptions of the taxa are the same statewide; at present there is some disagreement between two of the most prominent Illinois floras (Mohlenbrock 1986, Swink and Wilhelm 1994) concerning not only its range, but also whether this variety is truly distinct.

As part of the basic research on current populations of the Red honeysuckle, data such as counts of numbers of individuals present, the determination of the amount of yearly fruit/seed production, and an assessment of recruitment rates are greatly needed in order to monitor population dynamics and to assess the viability of any populations found. Counts should be made not only of individual stems, but whether or not these stems are interconnected (to help determine the actual number of individuals) and an attempt should be made to find immature (seed grown) individuals at the same sites. It is recommended that surveys be conducted during the flowering and fruiting periods because it is very difficult to identify the plant without the flowers, and fruits must be counted to determine fertility. The populations of *Lonicera dioica* 'var. *glaucescens*' in southern Illinois are only rarely monitored by botanists working on behalf of the state Natural Heritage programs and other organizations and few appear to have ever seen it there.

In addition to the basic effort of locating additional populations of the variety and conducting population counts, it would be useful to initiate a genetic investigation of the diversity within and between the known populations using DNA methodology. It would be especially important to discover if colonies are clonal or contain related individuals. This could be expanded to compare the local populations with the nearest populations in adjoining states to assess their origin or degree of genetic distance between them. The techniques for several aspects of monitoring and studying rare plant species are presented in Collins *et al.* (2001), Philippi *et al.* (2001), and Imm *et al.* (2001). Individual wild plants should be monitored over time. Such basic facts as fungal associations (if any), longevity, yearly variations in population size, pollination and pollinators, flower behavior, and seed establishment are not precisely known. Perhaps the plants (flowers) are self-incompatible, but this is not known. One study on an Asiatic barberry demonstrated that

fruit set and fruit weight can be improved by spraying with 200 ppm gibberellic acid (GA3) at full bloom and again 15 and 30 days later (Malasi *et al.* 1989). Perhaps this would also work on the honeysuckles.

No research programs directed at management needs for this plant are known at this time. It is known that *Lonicera dioica* 'var. *glaucescens*' is a plant of open woodlands in most of its range and that most of these habitats have grown closed with trees and shrubs since the elimination of a natural fire regime in midwestern areas of the United States. Some limited research on the effects of prescribed fire or selective thinning of the canopy could be conducted in order to determine the effects of increased light levels on the populations for the purpose of better management. Because there is a need to determine the optimal habitat for the species and how to best maintain it, long-term monitoring of known populations should be conducted every 1-2 years to track their status with respect to these current management activities.

Botanical surveys conducted by scientists from the Illinois Natural History Survey have shown repeatedly that with sufficient time and funding, and an experienced eye, many plants thought to be extirpated or else threatened or endangered can be found at additional locations (Hill 2002). These investigations have been important in that they have led not only to the de-listing of species once thought to be rare, but they have also resulted in the discovery of species previously unknown in the state. The U.S.D.A. Forest Service and other related agencies have done a fine job in the effort to preserve rare species with the resources that they have available. Much of the locating and monitoring of known populations of rare species in southern Illinois has been conducted by Forest Service biologists in cooperation with Illinois Department of Natural Resources personnel. However, a continuing problem is that there is neither sufficient funding nor are there enough botanists available to survey the immense area that needs to be covered in the monitoring of the large numbers of sensitive plants, including this one. It appears that a high priority should be given to the training and hiring of more qualified field botanists to achieve these goals.

RESTORATION

There are no known restoration efforts being conducted on *Lonicera dioica* 'var. *glaucescens*' anywhere in its range. The difficulty in maintaining this species is that some active management appears to be necessary, but the ideal means and combination of maintaining sufficient water availability along with an open exposure has not been fully determined. For this reason, great caution should be exercised in restoration and management programs at this time.

The generally recommended method to restore populations of this and other rare plants is to protect and manage their habitat. Protection of the hydrology and thin soil layer of the sites may

be crucial, along with the maintenance of an open area. Girdling a few selected trees may be effective. Exotic and aggressive species must be completely eliminated from each site. This would entail physically pulling them out because it is very likely that herbicide application would eliminate this species at a site. The additional use of controlled burns, the thinning of the overstory, and the thinning of competing understory species may be beneficial to this plant but should be implemented with caution because of a lack of basic data concerning the specific effects of these management techniques on this plant.

Along with habitat management efforts, restorations of native plant species are recommended using only propagated material grown from native, local populations to avoid interbreeding with genotypes not adapted to the local conditions and to avoid compromising the local gene pool. If this rule is not followed, the result is generally the loss of plants because they are not competitive under local conditions. Another result could be the success of a plant or plants that can not be considered truly native (a reconstruction rather than a restoration). This is why local plants should be propagated for planting in such an effort, doing no damage to the source plants.

The variety is occasionally available for sale in the nursery trade, but not on a regular basis. It was found in the catalog of a grower in the Netherlands, for example (http://www.esveld.nl/htmldia/loglau.htm). This variety is not as showy as the related species *Lonicera sempervirens*, and so it is generally not grown much in gardens and it does not appear to be in danger from collectors.

The secure establishment or effective augmentation of wild populations is dependant upon their sexual reproduction and subsequent seed germination, but the detailed conditions under which germination is triggered in this species are unknown. It is thought that a cold treatment and some scarification of the seed coat may be needed to encourage germination. This treatment is typical for northern latitude deciduous species that are dispersed after passing through the digestive system of birds. Propagation by seed is the best means to insure genetic variability.

Honeysuckles, in general, are known to be readily propagated by means of stem cuttings. Several deciduous species are known to be best rooted when propagated from softwood cuttings collected in the summer (Dirr and Heuser 1987). The few extant wild plants in southern Illinois should be propagated in this manner under controlled nursery conditions. This is an important first step, because it is important to conserve the plant even if only in cultivation in case the wild plants are lost. This may also enable the planting of the local genotype into other suitable habitats in the vicinity of the few remaining plants to help avoid their tragic chance destruction.

SUMMARY

Lonicera dioica 'var. *glaucescens*', the Red honeysuckle, is a perennial fibrous vine that has also been described as a climbing shrub. It has small yellowish to distinctly rose-colored flowers, globose reddish-orange berries, and it has leaves that are sparsely to densely villous-pubescent and glaucous (pale-waxy) beneath. The status of the variety is controversial and some botanists currently do not accept it as distinct; moreover, the name by which it is listed as Endangered in Illinois is incorrect. In the northern part of its range, where it is most common, it grows mainly in moist open forests and thickets and occasionally on dunes, outcrops, or in wetlands. Towards the south it is restricted to the margins of steep, primarily sandstone outcrops with dependable moisture. The species itself is found in much of the United States east of the Rocky Mountains (in 31 states) and Canada (in 8 provinces). The range of 'var. *glaucescens*' tends to be in the western portion of the range of the species in 17 states and 7 Canadian provinces. It propagates primarily by seeds, but its stems are capable of rooting and new plants are easily established. Globally, the species ranking is G5 (secure world-wide).

The Red honeysuckle (as *Lonicera dioica* var. *glaucescens*) is listed as Endangered in Illinois, the var. *orientalis* Gleason is listed as Endangered in Kentucky, and the species collectively has been listed as Endangered in Maine and of Special Concern in Tennessee. The Red honeysuckle (as var. *glaucescens*) has been included on the Regional Forester Sensitive Species list (RFSS) for the Shawnee National Forest but not the Hoosier National Forest. In Illinois the typical variety is considered to be secure but the 'var. *glaucescens*' is considered to be a probable relict of colder periods in southern Illinois and it is considered vulnerable because it has only two known occurrences; there may be only one genetic individual at each site. It faces extirpation in Illinois if it is not properly protected.

The highest priority regarding the species in Illinois is to determine if it should be maintained as a distinct variety and continue to be listed as endangered. Secondly, it is recommended that existing individuals be propagated to ensure that the southern genotypes of this plant are not lost due to tragic natural disasters. Third, searches should be conducted for more plants in suitable habitat. Management through protection of its habitat should be done cautiously because of a lack of knowledge concerning management effects; the studies may include the controlled use of fire and the selective thinning of surrounding trees, but active management methods can not yet be recommended. It is recommended that rock climbing be banned where it grows, and that control of invasive Japanese honeysuckle in its vicinity be instituted by means of careful manual, not herbicidal, means.

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APPENDIX 1.

Representative specimens of *Lonicera dioica* 'var. *glaucescens*' examined or cited in the literature

Herbaria:

ILLS = Illinois Natural History Survey, Champaign. MIN = University of Minnesota, Saint Paul. NY = The New York Botanical Garden, Bronx. SIU = Southern Illinois University, Carbondale. USF = University of South Florida, Tampa. WIS = University of Wisconsin, Madison.

UNITED STATES OF AMERICA

ILLINOIS: JACKSON CO., 1 large live clump overhanging the trail, Little Grand Canyon, 6 miles southwest of Murphysboro, 16 May 1969, *Schwegman 2139* (SIU-not yet seen)

MINNESOTA: BROWN CO., Flandrau State Park, s. side of Cottonwood River valley, dry-mesic ridge on steep N slope, with *Cornus rugosa*, *Viburnum rafinesquianum* and *Carex eburnea,* 26 May 1999, *Harris 99023* (MIN); CARLTON CO., Skunk Creek Basin, Hwy 103 s. of creek (T47N, R17W Sec.35), clay bank, edge of road, full sun, 3 Jun 1976, *Stackler 1421* (MIN); CASS CO., Gull Lake, Jun 1893, *Ballard B.1246* (MIN); ISANTI CO., Bethel Twp., Cedar Creek Nat. Hist. Area, hardwood forest, 22 May 1961, *Moore 25352* (MIN); KITTSON CO., Norway Dunes Preserve, west slope of ditch grade, 17 Jun 1983, *Boe 1926* (MIN); LAKE CO., backwater canoe area, Moose Lake, 20 miles east of Ely, 19 Jun 1981, *Edwards s.n.* (ILLS); LAKE OF THE WOODS CO., Clementson, at mouth of Rapid River, near rock outcrops, 22 Jun 1979, *Boe 331* (MIN); POLK CO., Agassiz Dunes Preserve, about 1.5 miles southwest of Fertile., sandy soil in oak savanna, 16 Jun 1979, *Sperling 4766* (MIN); POPE CO., Moe Woods Preserve, steep west-facing birch covered slope, 25 May 1982, *Converse 869* (MIN); ST. LOUIS CO., Embarras River south of Biwabik, sandy jack pine forest, 24 Jun 1950, *Lakela 10530* (MIN); WRIGHT CO., East bank of the Clearwater River, about 4 miles south of its confluence with the Mississippi River in Clearwater, edge of a woods on the top of an eroded bank, 25 May 1980, *Smith 2167* (MIN)

NEBRASKA: RICHARDSON CO., sandy clay soil among small trees on steep slope by south shoulder of Rulo-White Cloud Road, NE quarter of Sec. 26, R 18 E, T 1 N, 9 Jul 1974, *Shildneck C-6723* (ILLS)

OHIO: FRANKLIN CO.(?), limestone banks of the Scioto River near Columbus, 1839, *Sullivant 43* (NY - syntype of *Lonicera glaucescens* Rydb. f. *dasygyna* Rehder; annotated as *L. dioica* L. by C.H. Perino, 1975)

WISCONSIN: ROCK CO., Afton, south side of Bass Creek, disturbed woodland on sandstone bluffs, T 2 N, R 12 E, sect. 28, 24 May 1995, *Hill 26543* (ILLS, USF); VILAS CO., Grassy Creek, 46 ° 09' 07" N, 89 ° 35' 56" W, 18 Jun 1996, *Crane 96-152* (ILLS).

note: Numerous specimens at WIS. Counties included: **WISCONSIN**: Bayfield Co.; Burnett Co.; Chippewa Co.; Clark Co.; Columbia Co., Dane Co., Door Co., Douglas Co.; Dunn Co.; Fond du Lac Co.;Green Co., Iowa Co., Jackson Co., Jefferson Co.; Juneau Co.; Kewaunee Co.; Lincoln Co.; Manitowoc Co.; Marathon Co., Marinette Co.; Menominee Co.; Oneida Co.; Polk Co.; St. Croix Co.; Sauk Co.; Sawyer Co.; Shawano Co.; Sheboygan Co; Trempealeau Co.; Vernon Co.; Vilas Co.; Washington Co.; Washburn Co.; Waupaca Co.

CANADA

SASKATCHEWAN: Buffalo Pounds Provincial Park, woodland border, 18 Jun 1971, *Evers & Crane 105319* (ILLS); Buffalo Pounds Provincial Park, woods, 18 Jun 1971, *Evers & Crane 105335* (ILLS)

APPENDIX 2.

The Distribution of *Lonicera dioica* 'var. *glaucescens*' in the United States. Information from herbarium specimens and the literature. [Incomplete]

STATE	COUNTIES	NOTES
Arkansas	?	Smith (1978) doesn't distinguish vars.
Illinois	Jackson	includes Shawnee N.F.; IL Dept. of Natural Resources (2002); Mohlenbrock (1986); Schwegman, pers. comm.
Indiana	Adams, Huntington, Jefferson, La Grange, Lawrence, Montgomery, Noble, Putnam, Saint Joseph, Steuben, Warren, Whitley	Deam (1940), f. *dasygyna* (Rehder) Deam known in Steuben, Wells, Whitley
Iowa	Fremont, Guthrie, Harrison, Lyon, Madison, Monoma, Osceola, Pottawatomie; apparently elsewhere as well	Barkley *et al.* (1977-atlas); Gleason and Cronquist (1991)
Kansas	Bourbon, Brown, Doniphan, Geary, Jackson, Montgomery, Pottawattamie	Steyermark (1963); Barkley *et al.* (1977-atlas)
Kentucky	?	see W-2; Steyermark (1963)
Michigan	?	Gleason and Cronquist (1991); var. not distinguished in Voss
Minnesota	> 14 counties, widespread	Barkley *et al.* (1977-atlas); Cholewa, pers. comm.
Missouri	Audrain, Clark, Knox, Lewis, Monroe, Monteau, Montgomery, Morgan, Perry, Pike, Ralls, Shelby, Taney	see W-2; Steyermark 1963; Barkley *et al.* (1977-atlas)
Nebraska	Cass, Richardson, Sarpy, Thurston, Washington; eastern 1/4 of state	Barkley *et al.* (1977-atlas)

North Carolina	?	see W-2, W-4; Radford *et al.* (1968) doesn't distinguish vars.; Steyermark 1963
North Dakota	21 counties, least common in central and southwest areas	Barkley *et al.* (1977-atlas)
Ohio	?	Deam (1940); said to be present by M. Vincent (pers. comm.) but vars. not distinguished in Ohio
Oklahoma	?	Gleason and Cronquist 1991; no records of this species were found in the Oklahoma database (Hoagland, pers. comm.)
Pennsylvania	> 25 counties, mostly western and mountains	Wherry *et al.* 1979, Rhoads and Block 2000
South Dakota	Custer, Day, Lawrence, Lincoln, Marshall, Minnehaha, Pennington, Roberts, Yankton	Barkley *et al.* (1977-atlas)
Tennessee	?	Chester et al.(1997); does not distinguish vars.
Wisconsin	present in 43 counties, missing in 29; probably least common in the southeastern counties	Wetter *et al.* (1991)
Wyoming	Crook [mostly Black Hills NF], Laramie	http://www.rmh.uwyo.edu ; W-2, W-3, Kartesz and Meacham (1999)

APPENDIX 3.

Natural Diversity Database Element Ranking System

modified from: http://www.cnpsci.org/html/PlantInfo/Definitions2.htm [W-6]

Global Ranking (G)

G1
Critically imperiled world-wide. Less than 6 viable elements occurrences (populations for species) OR less than 1,000 individuals OR less than 809.4 hectares (ha) (2,000 acres [ac]) known on the planet.

G2
Imperiled world-wide. 6 to 20 element occurrences OR 809.4 to 4,047 ha (2,000 to 10,000 ac) known on the planet.

G3
Vulnerable world-wide. 21 to 100 element occurrences OR 3,000 to 10,000 individuals OR 4,047 to 20,235 ha (10,000 to 50,000 ac) known on the planet.

G4
Apparently secure world-wide. This rank is clearly more secure than **G3** but factors exist to cause some concern (i.e. there is some threat, or somewhat narrow habitat).

G5
Secure globally. Numerous populations exist and there is no danger overall to the security of the element.

GH
All sites are historic. The element has not been seen for at least 20 years, but suitable habitat still exists.

GX
All sites are extirpated. This element is extinct in the wild.

GXC
Extinct in the wild. Exists only in cultivation.

G1Q
Classification uncertain. The element is very rare, but there is a taxonomic question associated with it.

National Heritage Ranking (N)

The rank of an element (species) can be assigned at the national level. The **N-rank** uses the same suffixes (clarifiers) as the global ranking system above.

Subspecies Level Ranking (T)

Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety.

For example: *Chorizanthe robusta* var. *hartwegii.* This plant is ranked **G2T1**. The G-rank refers to the whole species range (*i.e.*, *Chorizanthe robusta*, whereas the T-rank refers only to the global condition of var. *hartwegii.* Otherwise, the variations in the clarifiers that can be used match those of the G-rank.

State Ranking (S)

S1
Critically imperiled. Less than 6 element occurrences OR less than 1,000 individuals OR less than 809.4 ha (2,000 ac). **S1.1** = very threatened; **S1.2** = threatened; **S1.3** = no current threats known.

S2
Imperiled. 6 to 20 element occurrences OR 3,000 individuals OR 809.4 to 4,047 ha (2,000 to 10,000 ac). **S2.1** = very threatened; **S2.2** = threatened; **S2.3** = no current threats known.

S3
Vulnerable. 21 to 100 element occurrences OR 3,000 to 10,000 individuals OR 4,047 to 20,235 ha (10,000 to 50,000 ac). **S3.1** = very threatened; **S3.2** = threatened; **S3.3** = no current threats known.

S4
Apparently Secure. This rank is clearly lower than S3 but factors exist to cause some concern (*i.e.*, there is some threat, or somewhat narrow habitat).

S5
Secure. Demonstrably secure to ineradicable in the state.

SH
All state sites are historic; the element has not been seen for at least 20 years, but suitable habitat still exists. Possibly extirpated.

SR
Reported to occur in the state. Otherwise not ranked.

SX
All state sites are extirpated; this element is extinct in the wild. Presumed extirpated.

Notes:

1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a bird's eye or aerial view when ranking sensitive elements rather than simply counting element occurrences.

2. Uncertainty about the rank of an element is expressed in two major ways: by expressing the rank as a range of values (*e.g.*, **S2S3** means the rank is somewhere between S2 and S3), and by adding a '?' to the rank (*e.g.* S2?). This represents more certainty than S2S3, but less than S2.